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SULFUR DIPS FOR THE CONTROL OF GOAT LICE

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The Angora goat industry in the United States has developed to such importance since its inception in 1849 that anything seriously affecting its material welfare should receive the attention of everyone interested in this industry, which totals in excess of ten million dollars per annum.

It is of economic importance that the goats he kept free from lice, as the depreciation in value on account of lousy and tangled mohair runs at least from 5 to 15 percent. The loss in body weight of undipped animals during the development of the kid crop is considerable. The loss of kid hair, which has a higher commercial value than hair from the adult goats, is very heavy. Usually flocks of kids are slightly to grossly infested with lice. It has been observed that about 50 percent of the kids in the average lousy flock are stunted in growth and handicapped in their struggle for life. Infested goats are constantly irritated by the lice. In heavy infestations the skin thickens and becomes rough, coarse, and often scaly.

SPECIES OF LICE

In the United States there are at least five species of goat lice, all of which have been collected from Angora and milk goats. Two of these are blood suckers and are known as blue goat lice. 1/ The other three species have biting mouth parts and chew their food. The largest of the latter is known as the yellow or hairy goat louse.2/ The other two species are the red goat lice.3/

CONTROL MEASURES

For many years the arsenical dip has been largely used for control of goat lice. Coal-tar-creosote dips and tobacco or nicotine dips have also been used. All these, however, have objectionable features. The arsenical dip contains water-soluble arsenic and there is more or less danger of poisoning

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1/ Linognathus stenopsis (Burmeister) and L. africanus Kellogg and Paine.
2/ Bovicola renicellata Piaget.
3/ Bovicola caprae Gurlt and B. limbatus Gervais.

the animals when using it. The writer's experience with coal-tar-creosote dips has been that there is difficulty in getting a proper mixture with hard water, and the mohair is frequently stained and left in bad condition. In using nicotine dips he has not found them dependable at a strength of 0.7 percent nicotine and considers a higher nicotine content distinctly dangerous. The hot dip containing 0.07 percent nicotine is especially dangerous.

In an attempt to develop a safe and efficient dip without the objectionable features of the older dips, the writer has tested many chemicals at the Texas Agricultural Experiment Substation No. 14 at Sonora during a period of several years. The insecticides which gave the best results in these trials have also been tested on a larger scale under ranch conditions.

SULFUR

During recent years so much improvement has been made in the grinding of sulfur that it was thought advisable to carry on further investigations of its insecticidal value. The coarsely ground sulfurs of 80 to 100 mesh screen test did not give satisfactory results. Finely ground sulfur, i.e., 98 to 100 percent passing a 325-mesh screen, gave excellent results and is recommended for goat louse control. Likewise flotation sulfur, prepared by the liquid purification process, when further purified of the traces of iron and arsenic sulfide left by its manufacture, gave equally good results and is likewise recommended.

Finely ground sulfur with a wetting material added can now be obtained on the market in powdered form known as "wettable sulfur." This product is much more satisfactory for dipping purposes than those forms of sulfur which do not mix readily with water. Wettable flotation sulfur is also on the market.

The recommended dip for effective control, using either of the above sulfurs, is:

Wettable sulfur	10 pounds.
Water	100 gallons.

Two dippings with an 11-day interval are recommended. It must be borne in mind, however, that no dip can be depended upon to eradicate lice from a flock of goats unless every goat in the flock is carefully and thoroughly dipped. For this reason, whenever dipping is undertaken, it is absolutely necessary that one pasture be cleared of all goats before dipping starts. The freshly dipped goats should be turned into this pasture and all other pastures should be searched regularly for strays until time for the second dipping. Following the second dipping the same precautions should be taken. All un-

dipped goats found should be dipped as soon as possible. A single lousy goat or a stray that has passed through the fence line may, in 6 to 9 months, reinfest the entire flock. Reinfestation may also take place along the fence line. This is especially likely to happen during the goat-breeding season.

It can be seen that a county or statewide clean-up would be beset with difficulties, but it is believed that such an undertaking is worth while and is not beyond the possibility of success if sufficient diligence is exercised

DIPPING VATS

The long-type dipping vats are already installed on many ranches, where they have been used for dipping sheep and cattle. In such cases a change is not advised. However, the writer has found that a round vat, with an inclined exit, a draining pen, and a vat gate, has proved very satisfactory and in many respects superior to the long type for dipping goats or sheep. When the gate is located at the exit the animals swim in circles and crosswise in the vat, never piling up and drowning an animal, as may happen in a long vat. Such difficulties and losses are likely to occur when kids and nannies are dipped together in a long vat. The round vat is designed primarily for the average flock of goats, ranging from 500 to 2,000. A round vat 5 feet deep and 5 feet in diameter, with an inclined exit 24 inches wide and 100 inches long, will hold a little over 1,000 gallons of dip. Several of these vats are now in use in Texas and some are being built in New Mexico.

If a long-type vat is used, a gate should be placed near the exit so that all animals can be held in the dip for a sufficient length of time to assure having their heads as well as their bodies thoroughly soaked.

DIPPING

Fill the vat to the top if it is of the round type with concrete sloping dipping pen, and within 6 to 10 inches of the top if it does not have a concrete sloping pen draining into the vat. Stir the dip from the bottom just before starting the animals into the vat. Regardless of the type of vat used, each animal should be entirely submerged at least four times either by the use of dipping hooks or by hand. All animals should be left in the vat not less than one-half minute after the last one has been ducked the fourth time. Usually from 3 to 8 animals may be dipped at the same time. The ordinary long-type vat will hold many more goats than this, but it is not advisable to fill it to capacity on account of the danger incident to the crowding together of the goats at the exit end. If dipping is discontinued even for a short time before the entire flock is dipped, the dip should be stirred again before dipping is resumed.

Care should be taken that the dip does not become too low in the vat because of the amount carried out by the animals. Fresh dip should be added when the height of the liquid becomes materially lowered. After all the goats are dipped the vat should be emptied and cleaned out so that fresh dip may be used for the second dipping.

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Animals suffering from heavy infestations of internal parasites or in very poor condition from other causes should not be dipped. Such animals should be isolated, put in strong condition, and treated for worms before being dipped, if losses are to be avoided.

If injuries and losses are to be avoided the animals should be handled as quietly and carefully as possible. They should not be dipped when overheated or too soon after having been driven any considerable distance. They should not be thrown against the sides of the vat, or ducked repeatedly without giving them a chance to breathe. Weak animals should be helped so that they will not be held under the dip too long.

GOAT SCAB AND SHEEP LICE

Preliminary experiments indicate that goat scab mites can be killed satisfactorily by following the foregoing directions. While systematic dipping of goats for louse control will likely control scab also, the use of sulfur for the control of sheep and goat scab is not recommended in lieu of lime-sulfur or nicotine-sulfur dips at the present time.

Sheep lice are controlled by following the foregoing directions.

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